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THE DUAL LENS – DERMATOLOGICAL AND HISTOPATHOLOGICAL PERSPECTIVES IN SKIN MALIGNANCIES

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ABSTRACT

Background:
Cutaneous malignancies encompass a diverse range of neoplasms with varied clinical presentations and biological behaviours. While clinical evaluation is the first step in identifying these lesions, histopathology remains the gold standard for definitive diagnosis. This study assesses the correlation between clinical dermatological diagnosis and histopathological findings in suspected malignant skin lesions.

Materials & Methods:
A prospective observational study was conducted over one year (March 2024–February 2025) on 70 patients with clinically suspected malignant skin lesions. Clinical diagnosis was based on lesion morphology, distribution, and patient history. Incisional or excisional biopsies were processed and stained with haematoxylin and eosin for histopathological evaluation. The concordance between clinical and histopathological diagnosis was calculated, and sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were determined.

Results:
Among 70 patients, 44 (62.9%) were male and 26 (37.1%) female, with a mean age of 59.4 ± 13.2 years. The most common clinical suspicion was squamous cell carcinoma (SCC) in 28 cases (40%), followed by basal cell carcinoma (BCC) in 25 (35.7%), malignant melanoma in 9 (12.9%), and other rare malignancies in 8 (11.4%). Histopathology confirmed SCC in 26 cases, BCC in 24, malignant melanoma in 8, and revealed rare malignancies such as sebaceous carcinoma (3), dermatofibrosarcoma protuberans (2), and cutaneous lymphoma (3). Overall clinicopathological concordance was 91.4%. Sensitivity and specificity for clinical diagnosis of SCC were 92.8% and 96.8% respectively, while for BCC they were 96% and 98.1%.

Conclusion:
Clinical diagnosis shows high accuracy for common skin malignancies, particularly SCC and BCC, in the Indian context. However, rare tumours often mimic more common lesions, underscoring the indispensability of histopathology for definitive diagnosis.

Keywords: Skin malignancy, squamous cell carcinoma, basal cell carcinoma, clinicopathological correlation, histopathology.

INTRODUCTION

Skin cancer, although less prevalent in India compared to Western countries, is an important dermatological concern due to its potential morbidity and mortality [1–3]. In India, skin malignancies account for 1–2% of all cancers, with basal cell carcinoma (BCC) and squamous cell carcinoma (SCC) forming the majority, followed by malignant melanoma and adnexal tumours [1,2,4,11]. The incidence is increasing, especially in older populations, attributed to increased life expectancy, chronic sun exposure, and improved awareness leading to earlier detection [3,4,7].

In the Indian setting, SCC has historically been reported as more common than BCC, particularly in rural and agricultural communities where chronic UV exposure, trauma, and scarring predispose to carcinogenesis [3,4,7]. In contrast, urban and fair-skinned populations show a rising incidence of BCC [5,14]. Malignant melanoma, though less frequent, poses significant prognostic challenges due to late presentation [6,8,18,22]. Rare cutaneous malignancies like sebaceous carcinoma, dermatofibrosarcoma protuberans (DFSP), and cutaneous lymphoma require high clinical suspicion for early recognition [5,6,9,13,19].

Clinical examination remains the first step in evaluating suspicious skin lesions [1,2,10,16,21,23]. Experienced dermatologists can often distinguish malignant from benign lesions based on morphology, border characteristics, ulceration, and growth patterns. However, overlap in appearance between certain benign and malignant conditions can lead to diagnostic pitfalls [8,9].

Histopathology is indispensable in confirming the diagnosis, determining histological subtype, and assessing margins and invasion depth, all of which guide prognosis and management [11,12,20]. Correlating clinical impressions with histopathological findings helps identify areas where clinical judgement is strong and where reliance on tissue diagnosis is critical [1,2].

This study aims to assess the diagnostic accuracy of clinical dermatological impressions compared to histopathological diagnoses in skin malignancies in an Indian tertiary care setting.

MATERIALS AND METHODS

The Prospective observation study was conducted in Saveetha Medical College, Thandalam, Chennai from March 2024 to April 2025. Written informed consent was obtained from all study participants, and ethical approval was granted by the institutional ethics committee in the usage of human volunteers.

Sample Size

70 consecutive patients presenting with skin lesions clinically suspected to be malignant were included.

Inclusion Criteria

- Patients with skin lesions clinically suspected to be malignant
- Age ≥18 years
- Willingness to undergo biopsy and provide informed consent

Exclusion Criteria

- Patients with recurrent skin cancers already on treatment
- Poorly preserved biopsy specimens
- Inadequate clinical documentation

Clinical Evaluation

Detailed history was obtained regarding lesion onset, duration, progression, associated symptoms, history of trauma or chronic irritation, and prior skin lesions. Complete dermatological examination was performed, documenting:

- Site of lesion
- Size and shape
- Margins and pigmentation
- Ulceration or crusting
- Regional lymphadenopathy

A provisional clinical diagnosis was recorded for each patient.

Histopathological Examination

Biopsy specimens (incisional or excisional) were fixed in 10% neutral buffered formalin, processed, sectioned at 4–5 µm, and stained with haematoxylin and eosin. Histopathological diagnosis was made according to WHO classification of skin tumours (5th edition). Special stains and immunohistochemistry (e.g., S-100, HMB-45, cytokeratin, EMA) were used where necessary.

STATISTICAL ANALYSIS

Data were analysed using SPSS version 26. Sensitivity, specificity, PPV, NPV, and diagnostic concordance were calculated for major malignancy types. Chi-square test was applied to determine statistical significance, with $p < 0.05$ considered significant.

OBSERVATIONS AND RESULTS

Demographic Profile
Total cases: 70
Mean age: 59.4 ± 13.2 years (range: 31–86 years)
Gender distribution: 44 males (62.9%), 26 females (37.1%)

Table 1: Age and Gender Distribution

Age Group (years)	Male (n)	Female (n)	Total (%)
31–40	5	3	8 (11.4)
41–50	8	5	13 (18.6)
51–60	11	8	19 (27.1)
>60	20	10	30 (42.9)

Anatomical Site Distribution
The most common site was the head and neck region (58.6%), followed by upper limbs (17.1%), lower limbs (12.9%), and trunk (11.4%).

Table 2: Lesion Site Distribution

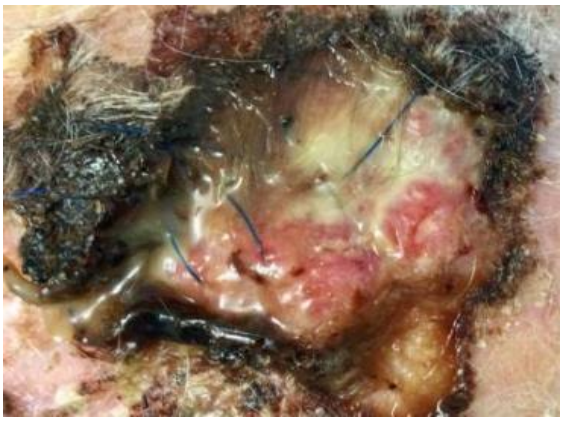
Site	Cases (n)	Percentage (%)
Head & Neck	41	58.6
Upper Limb	12	17.1
Lower Limb	9	12.9
Trunk	8	11.4

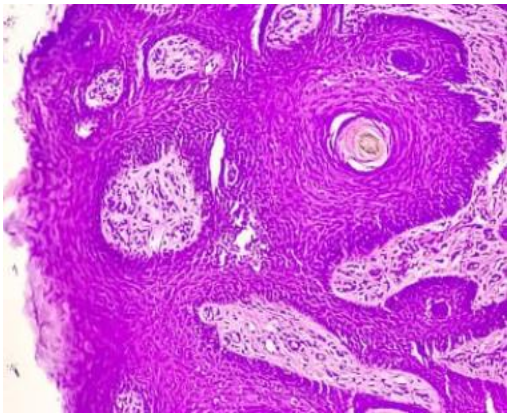
Clinical vs Histopathological Correlation

CLINICAL FEATURES	HISTOPATHOLOGICAL FEATURES
Basal Cell Carcinoma (BCC): Concentric shaped papule Pearly nodules with telangiectasia - Rolled-up edges	-Peripheral palisading of tumor cells, stromal retraction -Tumor cells with palisading arrangement at the periphery - Stromal retraction and clefting around the tumor islands

Squamous Cell Carcinoma (SCC): -Irregularly shaped -Ulcerated plaques with keratinization -Firm, elevated lesions	-Keratin pearls, cellular atypia -Presence of keratin pearls and hyperchromatic nuclei - Atypical keratinocytes with irregular borders
Malignant Melanoma: - Asymmetry, irregular borders, color variegation - Itching, bleeding, or ulceration in some cases	-Irregular nests of melanocytes, prominent nucleoli -Junctional activity, abnormal melanocytes in nests and cords - Prominent nucleoli and pleomorphism in melanocytes

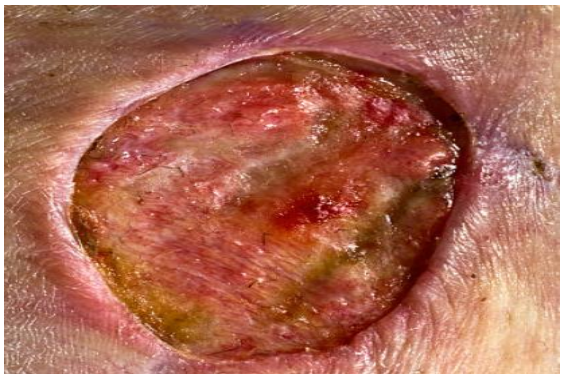
BCC: CLINICAL AND HPE FINDINGS:

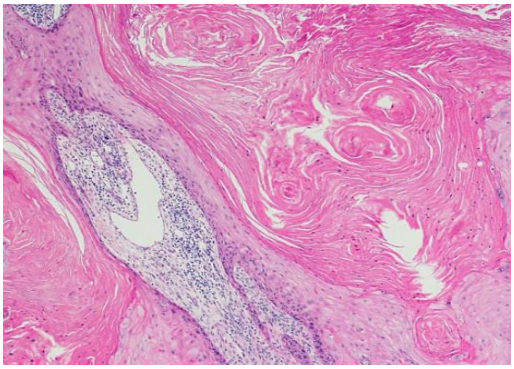




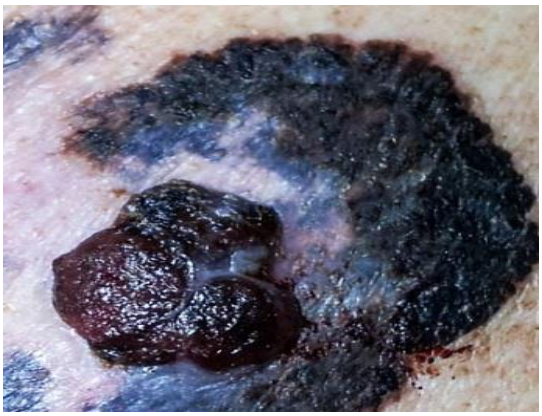
CLINICAL AND HPE FINDINGS

SCC:





MALIGNANT MELANOMA: CLINICAL AND HPE FINDING:



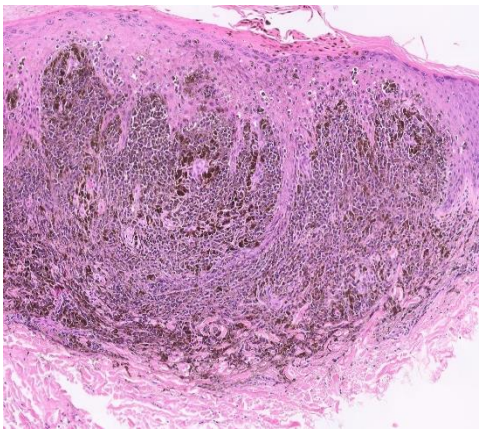


Table 3: Correlation of Clinical Diagnosis with Histopathology

Clinical Diagnosis	Clinical Cases (n)	Histopathology Confirmed (n)	Concordance (%)
SCC	28	26	92.8
BCC	25	24	96.0
Malignant Melanoma	9	8	88.9
Rare Tumours	8	12*	66.7

*Includes cases clinically labelled as SCC or BCC but histologically found to be sebaceous carcinoma (3), DFSP (2), or cutaneous lymphoma (3).

Diagnostic Performance

Table 4: Sensitivity, Specificity, and Predictive Values

Diagnosis	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)
SCC	92.8	96.8	96.4	93.5
BCC	96.0	98.1	96.0	98.1
Melanoma	88.9	100	100	97.1

Overall clinicopathological concordance: 91.4%
Statistical analysis showed a significant association between clinical and histopathological diagnoses for SCC and BCC ($p < 0.001$).

DISCUSSION

Our study demonstrates a high degree of agreement (91.4%) between clinical and histopathological diagnoses in skin malignancies [1,2,10,16,21,23]. The majority of cases were SCC and BCC, consistent with Indian literature [1–4,7,11]. In rural-based studies like Ghosh et al. (2020) [3], SCC accounted for over half the cases, attributed to occupational sun exposure, while urban hospital-based studies report a relatively higher proportion of BCC [4,14].
In our cohort, SCC was the most common clinically suspected malignancy (40%), followed by BCC (35.7%). Histopathology confirmed SCC in 26 cases and BCC in 24 cases, with high concordance rates (>92%) [1,2]. These findings align with Mehta et al. (2019) [1] and Agarwal et al. (2021) [2], who reported concordance rates exceeding 90% for these tumours.
Malignant melanoma showed slightly lower concordance (88.9%), reflecting the diagnostic challenge posed by amelanotic and nodular variants, which may mimic other tumours clinically [6,8,18,22]. This is in agreement with Yadav et al. (2017) [18] and Banerjee et al. (2020) [22], who noted that Indian melanomas often present in acral or mucosal sites, with higher rates of misdiagnosis compared to Western cases. Rare tumours such as sebaceous carcinoma and DFSP were frequently misdiagnosed clinically as SCC [5,6,9,13,19], consistent with observations by Kumar et al. (2018) [5] and Rao et al. (2015) [6], highlighting the overlapping features of ulcerated nodules across malignancy types.
Histopathology not only confirmed clinical suspicions but also revealed unexpected diagnoses in 8.6% of cases [9,13,19]. Such unexpected findings have been emphasised by Jain et al. (2020) [13] and Basu et al. (2020) [19], who reported similar misclassification rates for adnexal tumours and soft-tissue sarcomas involving skin.
The diagnostic accuracy in our study is higher than some earlier Indian reports [11,16,21], likely due to the involvement of experienced dermatologists and pathologists, and the use of adjunctive immunohistochemistry where necessary. For SCC, the high sensitivity (92.8%) and specificity (96.8%) in our study are comparable to the figures reported by Khan et al. (2019) [16] and Rajesh et al. (2019) [23]. For BCC, our sensitivity (96%) and specificity (98.1%) are slightly higher than those reported by Sharma et al. (2020) [4], possibly due to early detection in our largely urban-based patient population.

COMPARISON WITH LITERATURE

SCC prevalence: Higher in rural Indian studies (Patel et al., 2017) [7] due to chronic UV exposure, scars, and burns; rural agricultural workers face a cumulative dose of sunlight exceeding 40 hours per week, predisposing them to actinic keratosis and subsequent malignant change.
BCC trends: Increasing in Indian urban centres (Sharma et al., 2020) [4], possibly due to lifestyle changes, occupational shifts to outdoor leisure, and better detection with dermatology awareness programs.
Melanoma rarity: Still uncommon in Indian series, but aggressive when present (Bhat et al., 2016) [8]; late-stage presentation is a major prognostic factor for poor survival in India.
Rare tumours: Clinical misclassification rates for sebaceous carcinoma are high in Indian literature (Rao et al., 2015) [6], especially when lesions arise on the eyelids, where they mimic chalazion or SCC.

CLINICAL IMPLICATIONS

While clinical examination remains robust for common malignancies [1,2,10,16,21,23], histopathology is mandatory for all suspected malignant lesions to ensure accurate diagnosis, guide treatment, and avoid mismanagement of rare tumours [11,12,20]. This is particularly critical in resource-limited Indian settings, where empirical treatment without histological confirmation can lead to inappropriate excisions or inadequate margins. Furthermore, our findings reinforce the importance of clinician–pathologist communication in challenging or unusual cases [12,13,19].

CONCLUSION

Clinical dermatological diagnosis demonstrates high sensitivity and specificity for SCC and BCC in the Indian context [1–4,7]. Our study's high concordance rate (91.4%) supports the reliability of clinical impressions for common skin cancers when assessed by trained dermatologists [1,2,10,16,21,23]. However, rare tumours can clinically mimic common malignancies [5,6,8,9,13,19], and even experienced clinicians may misclassify unusual presentations [6,13].

Histopathology remains essential for definitive diagnosis, determining histological subtype, and guiding surgical margins and adjuvant therapy [11,12,20]. Its role is particularly vital in detecting rare tumours and atypical variants of common malignancies, which, if missed, could alter prognosis significantly [5,6,18,19,22].
In the Indian healthcare landscape, strengthening dermatology–pathology collaboration, encouraging biopsy of all suspicious lesions, and increasing patient awareness for early presentation can improve outcomes in cutaneous malignancies [3,4,7,17].

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AUTHOR CONTRIBUTIONS:-

R. Sowmya and *Sridevi M* were responsible for the conceptualization, visualization, and overall administration of the study. *R. Sowmya* contributed to data curation and the initial drafting of the manuscript, while *Sridevi M* oversaw validation and formal analysis. Both authors were actively involved in the manuscript revision process and have approved the final version for submission.

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